

## Preventive Health Psychology From a Developmental Perspective: An Extension of Protection Motivation Theory

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Theories of health psychology developed to explain adults' rational decision making were applied to 10-year-old children ( $n = 112$ ), who had not reached the stage of formal operational thought; 15-year-olds ( $n = 67$ ); and 20-year-olds ( $n = 93$ ), extending the protection motivation theory developed by R. W. Rogers (1983). Among the adolescents and young adults, the threat appeals worked only if people believed they could cope effectively with the danger; if they believed they could not cope, higher levels of the threat resulted in decreased intentions to refrain from tobacco use. Although children elaborated and integrated the information about threat severity, personal vulnerability, and response efficacy, the fragility and malleability of the children's beliefs in self-efficacy demonstrated the importance of adding a developmental perspective to theories of preventive health psychology.

*Key words:* protection motivation theory, children, adolescents, tobacco, prevention

Reviews of developmental issues in child health psychology have questioned whether the cognitive models devised to explain adults' health decision making can be applied to children (Maddux, Roberts, Sledden, & Wright, 1986). More generally, the problem is that verbal persuasion has been studied extensively with adults, but much less is known about changing the attitudes of children. The major purpose of this experiment was to determine whether one adult cognitive model of attitude and behavior change—protection motivation theory—could be extended from adults to children who had not yet achieved formal operational thought. Furthermore, adolescents were considered separately from young adults. There is a lack of empirical evidence about whether adolescents may be undue risk takers by adult standards, because of differences in values, failure to consider all options and consequences, assessing probabilities differently, feelings of invulnerability, and so on (Furby & Beyth-Marom, 1992).

The health issue selected was tobacco use (cigarette smoking and use of oral snuff) because of the high rate of morbidity associated with these behaviors and their high prevalence among youth. Smoking can triple one's chances of heart attack

(American Heart Association, 1983) and has been strongly linked to lung cancer and emphysema (U.S. Department of Health and Human Services, 1989). Approximately 417,000 lives lost per year (20% of deaths from cardiovascular disease and 30% of all cancer deaths) could be saved by the elimination of smoking (American Cancer Society, 1994; American Heart Association, 1994). Despite a general decline in drug use among the young, cigarette use has stayed at high levels. A survey of adolescents found approximately 30% to be smokers (Schinke, Botvin, & Orlandi, 1991). Additionally, a causal relation between oral snuff and cancer has been shown (see Mintz, 1986). Oral snuff usage by male 17–19-year-olds increased by a factor of 10 between 1970 and 1986, from 0.3% to 2.9% of that population (Goldsmith, 1988).

According to protection motivation theory (see Rogers, 1983; Rogers & Prentice-Dunn, in press), a health threat message (or any fear appeal) initiates two cognitive processes: threat appraisal and coping appraisal. The threat-appraisal process evaluates the factors associated with the response that elicits the danger (e.g., smoking), such as the severity of the danger and one's vulnerability to it. The coping-appraisal process evaluates one's ability to cope with and avert the threatened danger. Two of the major variables in this process are the efficacy of the response and one's ability to perform it successfully (see reviews by Rogers, 1983; Rogers & Prentice-Dunn, in press; Sutton, 1982).

The present experiment manipulated threat by combining information about (a) the severity of the health dangers of tobacco use and (b) the participants' vulnerability to these dangers. The second independent variable was coping, manipulated by combining information about (a) the efficacy of the recommended coping response (refrain from using tobacco) and (b) self-efficacy, or one's ability to refrain from using tobacco.

Previous studies have found that, in general, these threat and coping variables interact: If response efficacy or self-

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efficacy was high, higher levels of the severity of the threat and one's vulnerability to it resulted in stronger intentions to adopt the recommended response. If response efficacy or self-efficacy was low, increases in severity and vulnerability weakened intentions (a "boomerang" effect). This has been found in studies of intentions to moderate drinking (Kleinot & Rogers, 1982; Self & Rogers, 1990); intentions to stop smoking cigarettes (Rogers & Mewborn, 1976); intentions to protect oneself against sexually transmitted diseases (Rogers & Mewborn, 1976); acceptance of earthquake-preparedness behaviors (Mulilis & Lippa, 1990); and self-reported condom use (Witte, 1992). Although the mediators of this interaction effect have not yet been studied sufficiently, the weight of empirical evidence suggests that the same pattern should occur for adults and adolescents on the topic of tobacco use.

This was a cross-sectional study across developmental levels. Groups were selected not solely on the basis of age, but on age and a certain level of cognitive development. In studying age-related development and change, we recognize that age is merely a marker variable for underlying processes.

Although threat appeals that contain coping information appear to be an excellent strategy to promote health, Weinstein (1993) stated that a key question is whether dimensions of risk other than severity and susceptibility (e.g., imminent vs. delayed onset of symptoms) need to be considered. It has been suggested (Botvin et al., 1992; Evans et al., 1978) that messages targeting adolescent cigarette smokers should focus on more immediate effects of smoking. According to Weinstein's (1988) stage theory of preventive health behavior, short-term events are weighted more heavily than long-term events in decision making. Studies that have manipulated the time of onset of symptoms have found that it interacted in complex ways with the other variables in the studies (Chu, 1966; Smith-Klohn & Rogers, 1991). Elementary school-aged children, generally at Piaget's stage of concrete operations (Gardner, 1982), have been noted to focus more on current events than far-off future events, which may have had diminished realism for them (Craig, 1986). They have shown incompletely developed abilities, for example, in goal setting (Flavell, 1979) and in delaying gratification (Moore, Mischel, & Zeiss, 1976). Thus, there would seem to be benefits of incorporating early-occurring consequences in persuasive arguments that target children. It was predicted that any superiority of early over delayed health consequences in strengthening intentions would be more pronounced among children than among young adults and adolescents.

Maddux, Roberts, Sledden, and Wright (1986) expressed reservations about the extension of adult-tested theories of health behavior (e.g., protection motivation theory) to children. With respect to the threat-appraisal process, it may be questionable whether children, before the stage of abstract reasoning, can evaluate potential health threats and symbolically represent the potential illnesses. With respect to the coping-appraisal process, there may be differences between adults and children in the way (a) self-efficacy information is processed, (b) alternative causal sequences are evaluated, and (c) attributions of individual responsibility are made. Thus, a complete understanding of health risks may not occur until formal operational thinking is established in adolescence

(Bibace & Walsh, 1979; Perrin & Perrin, 1983). The extent to which children can benefit from persuasive health messages is an important question. No published study of protection motivation theory has presented health-threat communications to children, adolescents, and adults to compare their responses to each other.

On the basis of the foregoing considerations that children would react differently from adolescents and young adults, we predicted there would be two 3-way interaction effects (a Coping  $\times$  Age  $\times$  Threat interaction and a Coping  $\times$  Immediacy  $\times$  Age interaction). In the high-coping condition, adolescents and young adults were expected to have stronger intentions in the high-threat than in the low-threat condition. In the low-coping condition, they were hypothesized to exhibit lower intentions in the high-threat situation than in the low-threat one (i.e., the boomerang effect). When the low-coping messages were presented to 10-year-olds, we predicted they would show low levels of intentions regardless of the level of threat. Under conditions of high coping, if the consequences were to occur early, it was expected that 10-year-olds' intentions would be high at both levels of threat; however, if the consequences were to occur in the distant future, 10-year-olds were predicted to show equal and low levels of intentions at both levels of threat.

## Method

### *Participants*

The research participants were 9–10-year-old children ( $n = 112$ ), 14–16-year-old adolescents ( $n = 67$ ), and young adults ( $n = 93$ ), after the developmental screening and exclusions (discussed later). Their mean ages were 10.0, 15.7, and 20.0 years, respectively. The children (4th and 5th graders) and the adolescents (9th and 10th graders) were invited to participate during class time and had returned signed consent forms from their parents (64% return and participation rate for children and 63% return and participation rate for adolescents). The college students were enrolled in introductory psychology courses and participated to fulfill a course requirement. Because this was a prevention rather than a cessation study, 4 children, 42 adolescents, and 17 adults had been eliminated from this sample because they reported current use of tobacco, as were participants who provided reports with obvious contradictions due to random or careless responding. Female and male participants were distributed equally across ages and treatment conditions, except that female participants composed the majority of the college student group. The sample was 88.5% White (92.9% of children, 93.8% of adolescents, and 79.6% of adults), 8.1% African American (3.6% of children, 3.1% of adolescents, and 17.2% of adults), 1.5% Asian American (0.9% of children, none of the adolescents, and 3.2% of adults), and 1.1% Latin American (1.8% of children, 1.5% of adolescents, and none of the adults).

### *Design*

The experiment used a  $2 \times 2 \times 2 \times 3$  factorial design. The experimentally manipulated variables were threat (high or low), coping (high or low), and immediacy of consequences (early or delayed); age was the other variable in the design. A no-message control group was included at each age.

### Developmental Screening

To establish that the children did not yet have abstract reasoning abilities and that the adolescents and adults did, screening questions were derived from the Bibace and Walsh (1979, 1981) Piagetian model of the developmental changes in children's health conceptualizations. This assessment procedure asks for explanations of 11 health issues. If any answers used physiological or psychophysiological explanations, the participant was categorized as having the ability to reason abstractly about health. Otherwise, the participant was categorized as having concrete reasoning about health. For example, in response to the question, "What is pain?" the answer, "It's where some part of you hurts," in combination with similarly underelaborated responses to questions about illnesses, was considered concrete responding. Information about nerves, tissue damage, or sending information to the brain was considered an abstract answer to that question.

There were four raters. Reliability was assessed by assigning at least 50% of each rater's questionnaires to a secondary rater. Percent agreement was above 89% for all pairs of raters (this was true across participant age groups), although kappas averaged only .64, partially because of the low frequency of concrete responding among teens and adults.

To more clearly relate age-related effects to level of cognitive development, the young children who were the most advanced and the older participants who were the most delayed in this regard were not included in the analyses. Among 4th and 5th graders, 22 students were eliminated because they demonstrated abstract reasoning about health. Five adolescents and 5 college students were eliminated because they failed to demonstrate abstract reasoning about health. These students were excluded from the data analysis rather than placed in the appropriate developmental group because they may have differed in unknown ways on unmeasured variables.

### Procedure

After consent was obtained (and assent from the children), participants were randomly assigned to treatment and control groups. They were told the study was part of a project seeking evaluations of potential health education messages. They then completed the developmental screening and listened, in 3-5-person groups, to audiotaped persuasive messages, accompanied by a handout presenting identical information. Adolescents and adults heard identical messages, which were paraphrased at a simpler developmental level for the children. Using the Grammatik III program (Wampler & RSI Software Engineering Staff, 1989), the children's messages were determined to be at a 3rd- to 4th-grade reading level. Everyone heard a message about the threat (the dangers of tobacco use), how they could cope with it, and when the consequences of the threat would occur. Next, participants completed a postexperiment questionnaire. Debriefing included the statements that some information was presented for persuasive purposes and that tobacco use caused severe health problems they could avoid by not using it but that cancer may be cured. False statements were corrected. At the end of the debriefing we solicited questions and discussion from the children to make sure that they understood the debriefing.

### Stimulus Materials

The factorial manipulation of the independent variables was accomplished by the presentation of eight different persuasive messages. The *high-threat* communication emphasized that the participant was personally vulnerable to the severe effects of tobacco on the mouth, throat, lung, and heart. For example, "Your friends and family, maybe even you, might get some kind of cancer. . . ." The *low-threat* communica-

tion minimized the deleterious consequences and the participants' susceptibility to it. For example, "We have come a long way in our fight against health problems . . . they are not as likely to make people die" (child version) and "there has been considerable progress in our battle against health problems . . . not as likely to cause death . . ." (adolescent and adult version).

The *early-consequences* message stated that the previously described consequences of tobacco use begin to occur early in life, soon after one begins using tobacco. For example, "People who study this say that the problems can happen early in life." The *distant-consequences* communication argued that these consequences occur in later life, toward the end of the life span. For example, "People who get these problems are very old. . . ."

The coping messages contained information about the efficacy of the recommended coping response (not to use tobacco products) and information about self-efficacy. The *high-coping* message emphasized that the recommended coping response was effective in protecting against the threat and that each person could perform the response successfully. For example, "Stay away from tobacco. You will be healthier. It is easy to do" (child version), and "we recommend avoiding tobacco, because it is a great way to promote health . . . it is easy for you . . ." (adolescent and adult version). The *low-coping* communication minimized the effectiveness of the coping response and stressed the difficulty of performing the response. For example, "It is hard work to stay away from tobacco. And, staying away from it doesn't mean you will be healthy." The final part of the audiotape urged everyone not to start smoking and not to start using smokeless tobacco. The entire taped message was 10 min in length.

### Dependent Measures

To assess the validity of the manipulations, clusters of Likert items were included in the questionnaire. Five items measured perceptions of the threat (e.g., a severity item was "Mouth, throat, lung, and heart disease are horribly dangerous," and a vulnerability item was "I am likely to get health problems of the mouth, throat, lungs, and heart"). As estimates of reliability, Cronbach's alpha = .61 for children, .73 for adolescents, and .78 for adults. Two items checked on the manipulation of the time of consequences (e.g., "If I were to get problems of the mouth, throat, lungs, and heart, they would begin early in life";  $r_s = .83$  for children, .50 for adolescents, and .75 for adults). Six items assessed beliefs in coping ability (e.g., a response efficacy question was "By not smoking, people can prevent all of the health problems of the mouth, throat, lungs, and heart," and a self-efficacy item was "For people like myself, it is relatively easy to avoid cigarette use." Alphas = .93 for children, .84 for adolescents, and .81 for adults). Six items assessed behavioral intentions to refrain from smoking cigarettes (e.g., "I plan to avoid cigarettes at all costs during my lifetime." Alphas = .67 for children, .92 for adolescents, and .82 for adults), and six items measured intentions to refrain from using snuff (e.g., "I will experiment with smokeless tobacco in my lifetime, just to see what 'dipping' is like." Alphas = .73 for children, .86 for adolescents, and .57 for adults).

Participants rated their agreement with all items on 14-point Likert scales that ranged from *strongly agree* to *strongly disagree*. Items were varied so that a score of 14 represented complete agreement on some items and complete disagreement on others. The latter items were converted in scoring so that higher numbers represent stronger agreement. Scores on all dependent measures are based on the mean ratings for the items in each cluster.

### Results

The data were analyzed with 2 (threat)  $\times$  2 (coping)  $\times$  2 (immediacy)  $\times$  3 (age) analyses of variance (ANOVAs). The

Tukey-Kramer a posteriori test was used to make post hoc comparisons of interaction effects, and Dunnett's test was used to compare the no-message control group to the experimental cells. Differences reported are at the .05 level. Although girls and women expressed a greater aversion to using smokeless tobacco than did boys and men, gender is not discussed further, because male and female participants were not differentially affected by the independent variables.

### Validity of Manipulations

**Threat.** The ANOVA revealed a significant main effect for threat,  $F(1, 218) = 108.49, p < .001$ . The high-threat messages produced higher levels of perceived danger ( $M = 11.7, SD = 1.6$ ) than did the low-threat messages ( $M = 9.0, SD = 2.4$ ). The high-threat communication significantly raised beliefs in perceived threat above the control condition ( $n = 30, M = 10.5, SD = 2.3$ ), whereas the low-threat message significantly reduced scores to below those of the control group ( $p < .05$ ). There was also a Coping  $\times$  Immediacy interaction,  $F(1, 218) = 4.42, p < .04$ , but none of the pairwise comparisons were significant. No other significant main effects or interactions were found on the threat manipulation check.

**Immediacy.** The immediacy measure showed a significant main effect for the manipulation of the time of onset of health problems,  $F(1, 218) = 233.67, p < .001$ . Participants who heard early consequences had a higher mean ( $M = 10.1, SD = 3.4$ ) than did participants who heard distant consequences ( $M = 4.6, SD = 2.8$ ), reflecting beliefs in earlier onset of the health consequences. An Immediacy  $\times$  Age interaction effect,  $F(2, 218) = 8.27, p < .001$ , indicated that this main effect was more pronounced among children than adolescents or adults. There were no other significant main or interaction effects. The mean for the no-message control group ( $M = 8.2, SD = 3.5$ ) was significantly higher than that of the distant-consequences group and significantly lower than the mean for the early-consequences group ( $p < .05$ ).

**Coping.** There was a significant main effect for coping,  $F(1, 218) = 127.31, p < .001$ . The high-coping message ( $M = 10.9, SD = 2.7$ ) produced stronger beliefs than the low-coping message ( $M = 6.9, SD = 3.3$ ) that the recommended coping responses were effective and that the participants were capable of performing the responses. The participants in the no-message group ( $M = 9.1$ ) had significantly higher ratings than the low-coping group and significantly lower ratings than the high-coping group ( $p < .05$ ). There was also a Coping  $\times$

Age interaction effect,  $F(2, 218) = 19.77, p < .001$ . The high-coping message strengthened beliefs in coping ability more for adults and children than for adolescents. There were no other main or interaction effects.

### Behavioral Intentions

**Intentions to avoid cigarettes.** The ANOVA on intentions to avoid cigarettes indicated that there were significant main effects of age,  $F(2, 218) = 4.12, p < .02$ , and coping,  $F(1, 218) = 3.98, p < .05$ . Children ( $M = 12.9, SD = 1.6$ ) and adults ( $M = 12.5, SD = 2.2$ ), who did not differ from each other, had stronger intentions to refrain from smoking than did adolescents ( $M = 12.0, SD = 2.4, p < .05$ ). The high-coping message ( $M = 12.8, SD = 1.8$ ) produced stronger intentions than the low-coping message ( $M = 12.2, SD = 2.3$ ). The treatment effect (or deviation from the grand mean) for high coping was .26 (.25 when adjusted for the main effects of other factors), and the treatment effect for low coping was  $-.27$  ( $-.26$  adjusted). The Coping  $\times$  Age interaction effect,  $F(2, 218) = 3.07, p < .05$ , indicated the main effect of coping was more pronounced among the children than the adolescents or adults.

The Threat  $\times$  Coping  $\times$  Age interaction was also significant,  $F(2, 218) = 4.76, p < .01$ . Mean scores are shown in Table 1. The treatment effect for the high-threat factor level was .14, and the treatment effect for the low-threat factor level was  $-.14$ , in their unadjusted and adjusted forms. The overall effect size of the independent variables and their interactions, the  $R$ , was .243 for intentions to smoke cigarettes. As may be seen in Figure 1, among adults, the high-threat/high-coping messages resulted in significantly higher intentions than the low-threat/high-coping messages. The high-threat/high-coping group's ratings were also significantly higher than those of the high-threat/low-coping group.

As shown in Figure 2, the adolescents who heard high-threat/high-coping messages had significantly higher ratings than did adolescents who heard low-threat/high-coping messages or the high-threat/low-coping message. Additionally, adolescents who heard low-threat/low-coping messages had significantly higher ratings than did adolescents who heard high-threat/low-coping messages or low-threat/high-coping messages.

The interaction of threat and coping differed for the children. Figure 3 shows that children who heard low-threat/low-coping messages had significantly lower ratings than did

Table 1  
Mean Scores for Intentions to Avoid Cigarettes, by Condition

Condition	Participants									Marginals		
	Children			Adolescents			Adults					
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
No messages	12.77	1.56	11	11.36	4.62	7	12.72	2.71	12	12.42	2.90	30
Low threat/low coping	11.96	2.16	30	13.01	1.72	15	12.44	2.51	21	12.35	2.20	66
Low threat/high coping	13.49	0.97	26	10.93	2.27	14	11.86	2.23	15	12.39	2.05	55
High threat/low coping	12.80	1.02	19	11.58	3.26	16	11.85	2.35	19	12.10	2.35	54
High threat/high coping	13.35	1.19	26	12.34	1.86	15	13.24	1.40	26	13.08	1.47	67
Marginals	12.87	1.59	112	11.98	2.44	67	12.45	2.16	93	12.50	2.15	272

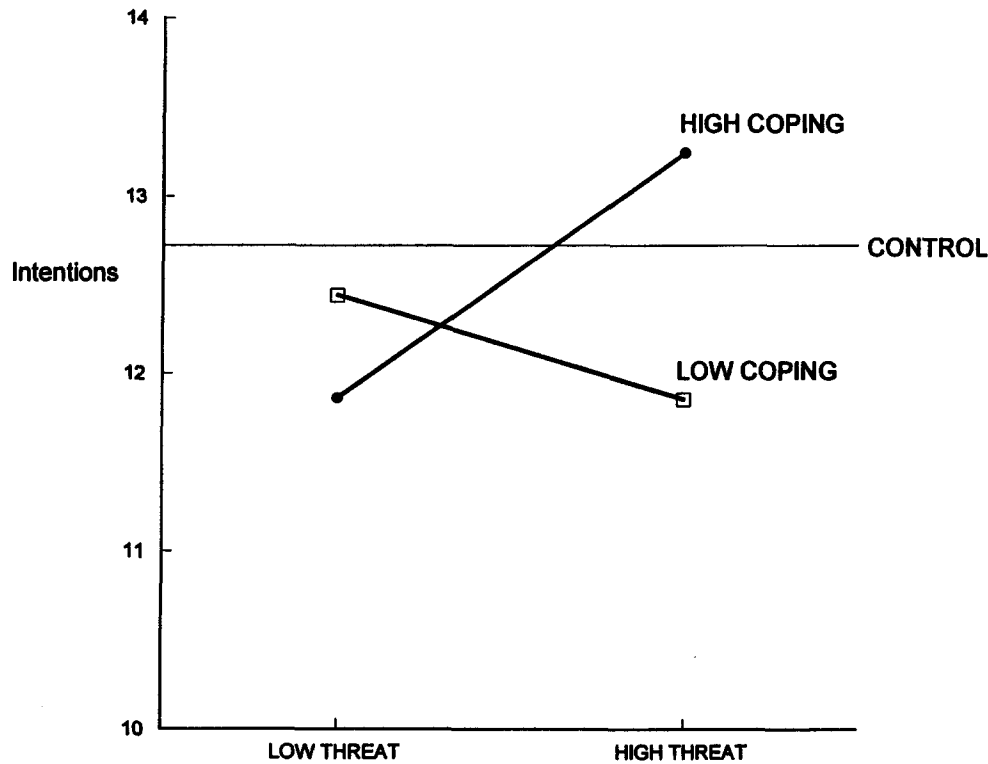


Figure 1. Young adults' intentions as a function of threat and coping.

children who heard high-threat/high-coping, high-threat/low-coping, and low-threat/high-coping messages. Although mean intentions to avoid cigarettes across age groups were higher in the high-threat/high-coping condition than in the control group, the control-experimental cell differences were not statistically significant.

*Intentions to avoid snuff.* A significant Coping  $\times$  Age interaction effect,  $F(2, 218) = 5.38, p < .005$ , suggested that children in the high-coping condition ( $M = 13.5, SD = 1.2$ ) had stronger intentions to avoid snuff than did children in the low-coping condition ( $M = 12.4, SD = 1.9$ ), although no follow-up comparisons reached significance at the .05 level, and there were no significant differences between experimental conditions and the control group.

There was also a significant Immediacy  $\times$  Age interaction effect,  $F(2, 218) = 3.25, p < .05$ . Follow-up comparisons indicated that children who heard distant-consequences messages had significantly higher intentions ( $M = 13.3, SD = 1.2$ ) than did children who heard early-consequences messages ( $M = 12.6, SD = 2.0, p < .05$ ). There were no other significant pairwise comparisons, significant differences among comparisons to controls, nor other significant main or interaction effects on intentions to avoid snuff. The overall effect size of the independent variables and their interactions was .168 for intentions to avoid snuff.

### Discussion

The information presented about the health threat and how to cope with it affected the children's, adolescents', and young

adults' beliefs and intentions to avoid the danger. Information about the threat of tobacco-related health problems, information about the ease and effectiveness of coping with the threat (avoiding tobacco), and age interacted to affect intentions to avoid cigarettes: Threat and coping messages were best in combination for young adults and teens, whereas coping was of most importance for children.

Before we explore the implication of the results, several limitations of the present study need to be addressed. First, it should be recognized that age is confounded with effects of cohort and other variables (see Schaie, 1994), as with any cross-sectional developmental study, such as impressionability in certain groups or at younger ages. However, we discuss our findings in terms of age for practical reasons; that is, health educators and others will address people of a certain age or grade and will not be able to administer developmental tests, so age is a good marker variable. The developmental test that we used could have selected for more intelligent adolescents or less intelligent elementary school children, exacerbating the difficulty in interpreting the differences as age differences. However, an analysis without the screening resulted in the same pattern of cell means and the same significant Threat  $\times$  Coping  $\times$  Age interaction ( $p < .008$ ), Coping  $\times$  Age interaction ( $p < .021$ ), and main effect of age ( $p < .024$ ). Also, there were no significant differences among the cell-size changes ( $p < .01$ ) at any age level, indicating that the cell reductions due to cognitive screening were not significantly nonuniform. The necessity to exclude tobacco users disproportionately excluded adolescents, creating another confound with age.

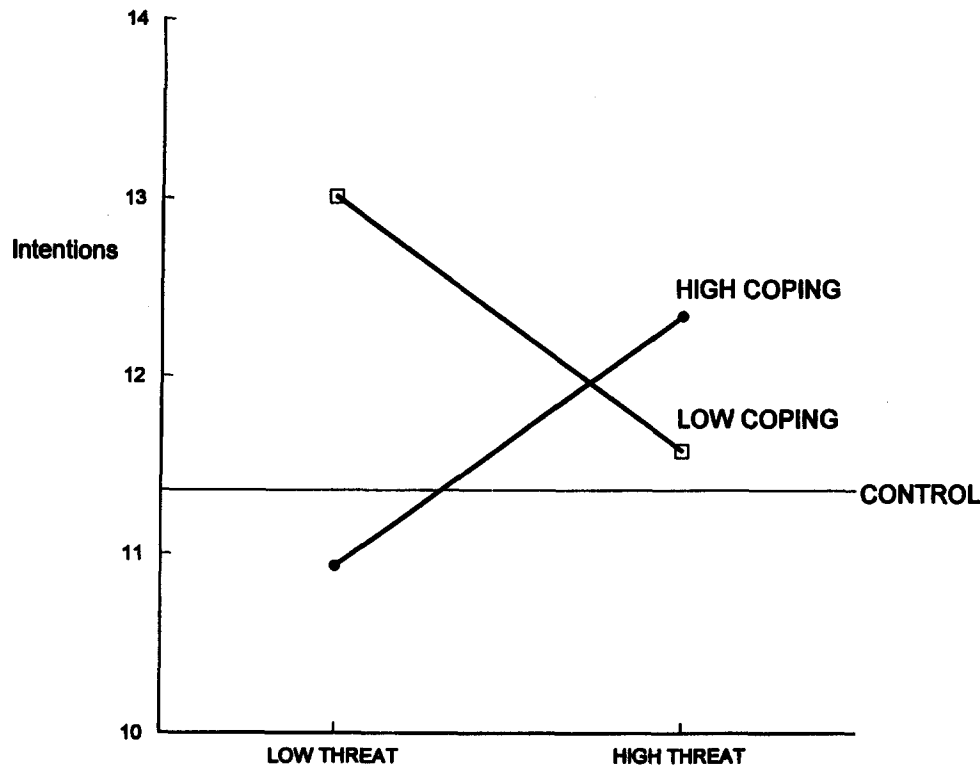


Figure 2. Adolescents' intentions as a function of threat and coping.

There may also have been differences in children and adolescents who did not return parental consent forms, but this is not known. Although we have no specific reason to believe that longitudinal or repeated measures of cohorts would show different effects, they would provide a desirable replication that confounded age with fewer variables.

Whereas actual tobacco use would be an ideal measure in a study like the present one, such behavior may not be apparent for years in prevention studies. Although not a substitute for behavioral measures, Ajzen and Fishbein (1980) have shown that intentions accurately predict behavior if they are measured properly, finding correlations of .6 to .8 between behavioral intentions and health behaviors such as smoking, drinking, and exercise. Also, these postexperimentally reported intentions do not appear to be transient. Previous studies demonstrated that the manipulation of threat increased smokers' intentions to stop smoking and actually increased the percentage of smokers who were able to stop smoking completely over a 1-year follow-up period (Rogers, Deckner, & Mewborn, 1978). In a review of studies of why children start smoking, Conrad, Flay, and Hill (1992) found that in eight of the nine studies reviewed, onset of smoking was predicted by the children's and adolescents' intentions to start smoking. Although intentions are a measure of the motivation to protect oneself from danger, it remains imperative to study the processes that translate motivation into action.

Several factors limit the generalizability of these findings. First, to use developmentally appropriate vocabulary, the youngest age group heard slightly different versions of the

messages and were administered slightly different questionnaire items, thus age was confounded with wording differences. It is also the case that wording could have lowered reliability of certain items, as when phrases such as "in my lifetime" were used with young adults or adolescents who may have had past use. That is, some participants' responses might have reflected past use rather than planned use, even though the items referred to planned use. Second, almost all of the participants in this investigation were middle class and White. The elementary and high schools chosen represented the middle-to-upper socioeconomic status segment of the community, congruent with the population of the state university used for the college sample. However, it should be recognized that students who go on to college may be more likely than younger students to differ from their age peers in IQ, motivation, and other characteristics. Future research should include more diverse socioeconomic and minority populations. Procedures to adapt smoking-prevention interventions to minority populations have recently begun to be addressed (e.g., Botvin et al., 1992). Third, it should be noted that the present study implemented interventions that were only approximately 10 min in duration. It could be expected that most prevention programs would be applied over several longer sessions, possibly enabling greater effects. Similarly, the collection of follow-up data over longer periods of time would help to ensure the maintenance of improvement.

Before discussing the major results of the study, an unexpected finding needs to be noted. For the children, the more distant in time the consequences of using snuff, the more they

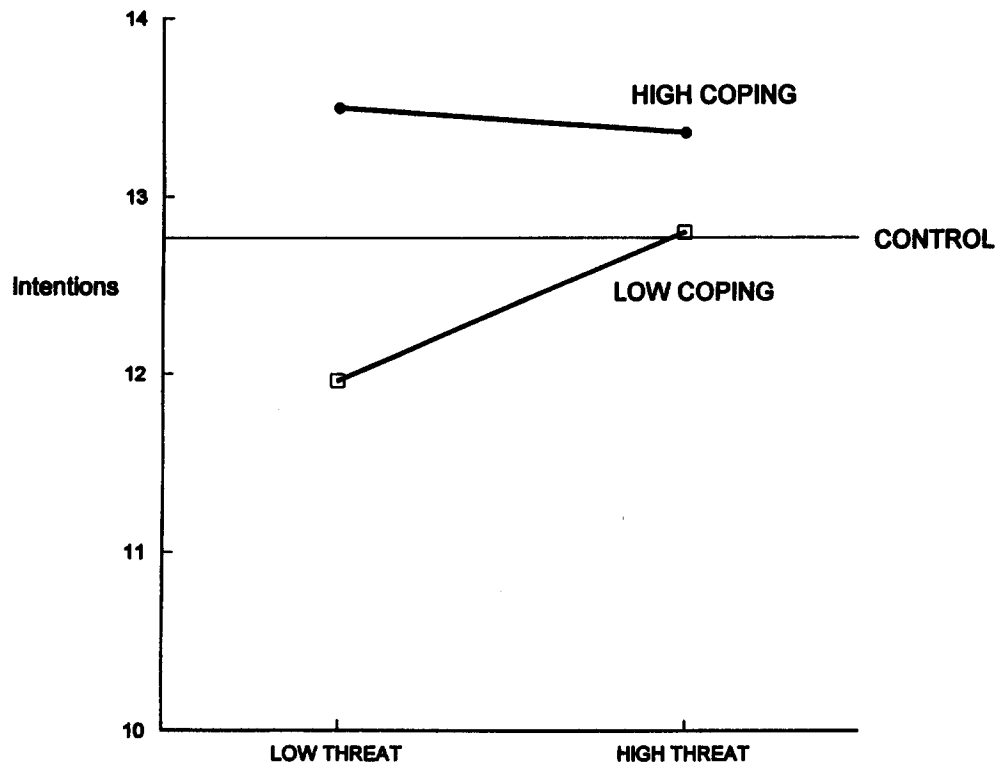


Figure 3. Children's intentions as a function of threat and coping.

were persuaded to refrain from using it. Mischel, Grusec, and Masters (1969) found that immediate punishments were rated (by young adults) as less aversive than delayed ones, indicating that waiting for a negative outcome is itself aversive and adds to the aversiveness of the negative outcome. At the least, our unpredicted finding indicates children were not susceptible to the self-destructive tendencies identified by Baumeister and Scher (1988), such as minimizing distant events to make them seem remote and improbable. The finding is encouraging, because for many health problems that occur late in life (e.g., lung cancer associated with smoking, heart disease secondary to a diet high in cholesterol), prevention should be initiated at a young age.

Another curious finding was that the adolescents who heard low-threat/low-coping messages had high intentions to avoid smoking. By implying that it would be hard to avoid tobacco, the low-coping message may have been perceived as a challenge by adolescents more than by other age groups (Furby & Beyth-Marom, 1992). In spite of this unexpected finding, we did see the expected beneficial combination of the high-threat/high-coping combination.

Finally, it should be noted that experimental groups did not differ from the control groups on the intention variables. This was a very brief intervention, and it was addressing a familiar issue. However, there were significant differences between the low and high experimental groups.

#### *Young Adults and Adolescents*

The interaction of the threat and coping variables on intentions to avoid cigarettes revealed that, among young adults and adolescents, increases in the level of threat strengthened intentions to avoid cigarettes if they thought they could cope successfully with the threat, but similar increments in the level of threat had a boomerang effect and decreased intentions if they thought they could not cope effectively with the threat. This Threat  $\times$  Coping interaction effect replicates previous interactions on intentions to moderate drinking (Kleinot & Rogers, 1982; Self & Rogers, 1990); intentions to stop smoking cigarettes (Rogers & Mewborn, 1976); intentions to protect oneself against sexually transmitted diseases (Rogers & Mewborn, 1976); acceptance of earthquake-preparedness behaviors (Mulilis & Lippa, 1990); and self-reported condom use (Witte, 1992).

Because controllability is related to interest in taking beneficial action (Weinstein, 1982), it is likely that the individuals who feel less able to determine their fate tend to act with less regard for the consequences. Or, it may be that individuals are attempting to restore perceived control by intending to smoke (Maddux & Rogers, 1983). The boomerang effect may also be understood if we assume that people are acting with some restraint in their health behaviors. But if people come to believe that a danger cannot be avoided, they may find no reason to continue to restrain themselves. Witte (1992) has

attempted to explain this phenomenon by extending Leventhal's (1970) danger-control process and fear-control process. Danger control deals with how people realistically try to prevent a threat from occurring, whereas fear control deals with how people handle their affective emotional states. Witte argues that when perceived efficacy is low, attempts to control the fear (e.g., defensive avoidance, denial) dominate attempts to control the danger. Self and Rogers (1990) found a tendency for people in their low-coping/high-threat condition to resort to wishful thinking, religious faith, defensive avoidance, and feelings of hopelessness and fatalism, but the effect was not significant. Clearly, research is needed that directly addresses the mediator or mediators of the boomerang effect.

The interaction effect is important from a practical, applied perspective because it is frequently argued that scare tactics do not work and can even backfire (Corah, Koch, & Eisenberg, 1977). Threat appeals do not backfire if people are persuaded that they can cope effectively with the danger. Further attention is needed to increasing adolescents' intentions, such as starting at earlier ages and using a combination of different strategies (Jackson, Bee-Gates, & Henriksen, 1994).

### Children

The effects of the health-threat messages on the cognitive mediators proposed by protection motivation theory and measured by our manipulation checks were generally the same for the children as for the adolescents and young adults. That is, the threat and coping information affected all participants' beliefs in severity, vulnerability, and response efficacy in the same directions. It is important to note that the children did not show many of the hypothesized cognitive deficits in processing information about health threats and how to cope with them.

Nevertheless, the children's data suggest some modifications of adult models of health-protective behavior when they are extended to audiences who have not achieved formal operational thought. The Threat  $\times$  Coping interaction indicated that, compared with the low-threat/low-coping condition, increments in the level of coping ability or increments in the level of threat in low-coping conditions significantly strengthened protective intentions. We can speculate that children may not have shown the boomerang effect (lower intentions in the high-threat/low-coping condition) because they may not have yet developed the adult strategies of attempting to restore perceived control or of fear control dominating danger control. However, the data clearly show that children's self-efficacy beliefs were easily shattered, which probably explains the weak intentions in the low-coping/low-threat condition. Nevertheless, even when self-efficacy beliefs were low, intentions were significantly higher when the level of threat was higher.

The Coping  $\times$  Age interaction on both types of intentions reveals that the coping information was more important to the children than to the older individuals. In a reference to Mattarazzo's (1982) emphasis of individual responsibility in behavioral medicine, Maddux et al. (1986) stated that the concept of individual responsibility "is the most troublesome in applying the goals of health psychology or behavioral health

to children" (p. 30). This problem was substantiated by our finding that feelings of self-mastery can be devastated rather easily. But we also found that high levels of self-efficacy can be instilled and that children are able to undertake responsibility for their own health behavior.

Although children at the concrete operational stage of cognitive development may not be able to know why particular health outcomes will happen, they are capable of understanding what behaviors are appropriate and encouraged. Taking responsibility for their health behavior in this context involved understanding that the recommended actions were good actions to take and ones that they could do. By providing a clear strategy and rationale for its effectiveness, children's self-efficacy and response efficacy for avoiding tobacco was increased, and this in turn resulted in higher levels of intentions to avoid tobacco. We should focus on teaching them what actions are best and how they can be effective in executing them.

Fourth- and fifth-grade children are at a stage of social development in which they are very concerned with their own competence and their abilities (Weisz, Sweeney, Proffitt, & Carr, 1993), and this is related to intentions to smoke (Jackson et al., 1994). In Erikson's (1963) terms, the 10-year-old children in the present study were at the stage of *industry versus inferiority*. Information concerning how effectively they could accomplish the recommended health actions was probably the most salient and important information to them because competency issues were the most relevant to their stage of social development. They are dealing with competency issues in their daily lives and are especially attuned to information that could help them answer the question, Am I competent? Beliefs in self-efficacy were probably so easily manipulated because these children had not completed this developmental stage. Therefore, theories of health psychology should devote greater attention to the developmental perspective.

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